CESM Tutorial

NCAR Climate and Global Dynamics Laboratory

CESM 2.0

CESM1.2.x and previous (see earlier tutorials)

Alice Bertini

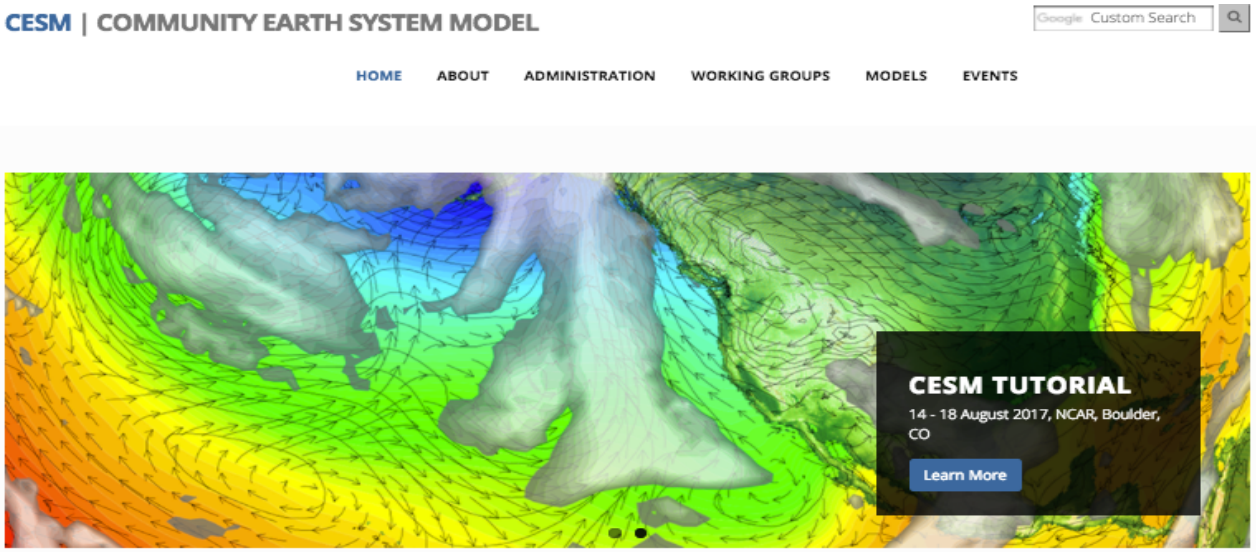
NCAR is sponsored by the National Science Foundation

Outline

- The CESM webpage
- Software & Hardware Requirements
- One-Time Setup
- Creating & Running a Case
- Getting More Help
- 7th Inning Stretch
- Review of Hands-on Exercises

CESM Web Page

http://www.cesm.ucar.edu



CESM Web Page Models

http://www.cesm.ucar.edu/models/current.html

CESM Models | CESM Supported Releases

You should use the most recent version of the model that is available unless you are trying to replicate previous results or create a branch run from a previous experiment. A complete list of CESM scientifically validated configurations is available for users needing to run the model in one of these configurations.

This table lists the most current supported CESM release versions.

Supported CESM Release Versions	
CESM1.2.z	Release Notes includes: What's New - Science, What's New - Software, Answer-Changing Features, Supported Machines, and Known Problems
CESM 1.1.z	Notable Improvements
CESM 1.0.z	Notable Improvements

CESM Model Version Naming Conventions

CESM X.Y.Z - CESM model release versions include three numbers separated by a dot (.) where:

- X - corresponds to the major release number indicating significant science changes.
- Y - corresponds to the addition of new infrastructure and new science capabilities for targeted components.
- Z - corresponds to release bug fixes and machine updates.

Each release includes the complete collection of component model source code, documentation, and input data. For model output data, see the Experiments and Output Data section of this website.

Users should read the CESM Data Management & Distribution Plan which documents the procedures for the storage and distribution of data associated with the CESM project.

A note about scientifically validated configurations and which release version of the CESM to use for your experiments

Scientific validation of the CESM consists of a multi-decadal model run of the given component set at the target resolution, followed by scientific review of the model output diagnostics. All scientifically supported component sets are also accompanied by diagnostic and model output data.

CESM 1.2.z is in the process of adding scientically validated configurations and these will be posted on the web site as they become available.

Component sets and resolutions are backward compatible with all CESM releases. However, newer releases of the CESM allow for additional compsets, resolutions and machines.

The DiscussCESM Forums bulletin board can also provide specific recommendations from the CESM community regarding which release of the model to use for your specific requirements.

CESM Project

CESM is a fully-coupled, community, global climate model that provides state-of-the-art computer simulations of the Earth's past, present, and future climate states.

CESM is sponsored by the National Science Foundation (NSF) and the U.S. Department of Energy (DOE). Administration of the CESM is maintained by the Climate and Global Dynamics Laboratory (CGD) at the National Center for Atmospheric Research (NCAR).

CESM Models

Overview

Supported Releases

Scientifically Validated Configurations

Experiments

CMIP6

Projects

Community Projects

Simpler Models

DiscussCESM Forums (CESM Bulletin Board)

Legacy

Legacy Releases: Older General/Run Info

Related Information

Downloading the CESM Code

CESM Data Management & Distribution Plan

CESM Development Project Policies & Terms of Use

CESM Support Policy

DiscussCESM Forums Bulletin Board

CESM 2.0 Web Page

http://www.cesm.ucar.edu/models/cesm2.0/

In Development - CESM2

About CESM2

TO DO Brief Description of CESM2

- What's New in CESM2
- CESM2 Supported Release Tags and Notes

Scientific Validation

Scientific validation consists of a multi-decadal model run of the given component set at the target resolution, followed by scientific review of the model output diagnostics. All scientifically supported component sets are also accompanied by diagnostic and model output data.

- Experiment Diagnostics
- Experiment Output Datasets on the Earth Systems Grid
- Experiment Case Naming Conventions
- Experiment Output File Naming Conventions

Quick Start Documentation

- CESM2 Quick Start Guide
- TODO - move these into quick start guide User Workflows and Examples
- Register and Download
- Getting Help - DiscussCESM Forums

CESM Project

CESM is a fully-coupled, community, global climate model that provides state-of-the-art computer simulations of the Earth's past, present, and future climate states.

CESM is sponsored by the National Science Foundation (NSF) and the U.S. Department of Energy (DOE). Administration of the CESM is maintained by the Climate and Global Dynamics Laboratory (CGD) at the National Center for Atmospheric Research (NCAR).

Related Information

Downloading the CESM Code

CESM Data Management & Distribution Plan

CESM Development Project Policies & Terms of Use

CESM Support Policy

DiscussCESM Forums Bulletin Board

CESM 2.0 Web Page - continued

http://www.cesm.ucar.edu/models/cesm2.0/

CIME - Documentation

Common Infrastructure for Modeling the Earth (CIME) contains the support scripts (configure, build, run, test), data models, essential utility libraries, a "main" and other tools that are needed to build a single-executable coupled Earth System Model. CIME is available in a stand-alone package that can be compiled and tested without active prognostic components but is typically included in the source of a climate model. CIME does not contain: any active components, any intra-component coupling capability (such as atmosphere physics-dynamics coupling).

- Common Infrastructure for Modeling the Earth (CIME) User's Guides
  Includes CIME, Driver-Coupler and Data Models Documentation

Active or Prognostic Components

Each model component page contains descriptions and documentation for active or prognostic models.

- Atmosphere
- Land
- Land Ice
- Ocean
- Sea Ice
- River Runoff
- Wave

All CESM2.0 Component Configurations

TODO - update just prior to release

Component configurations includes settings required for CIME enabled models; both prognostic and data model components. These configuration setting include:

- Component sets (compsets) defined by prognostic components
- Component Fortran Namelist settings
- Component XML variable definitions

- TODO - move these into Component Sets (compsets)
- Component Namelists and XML Variables Definitions

Model Grids and Machines

TODO - update just prior to release

- Grid Resolutions
- Supported Machines

CESM 2.0 Web Page - Continued

http://www.cesm.ucar.edu/models/cesm2.0/

Performance Data

- Performance and Load Balancing Data
- Running CESM2 on a Medium-sized Linux Cluster

External Library Documentation

- Parallel I/O Library (PIO)
- Model Coupling Toolkit (MCT)
- Earth System Modeling Framework (ESMF)
- * External Python Based Tools

  *** Support for these tools is currently limited to NCAR machines only!**. Access to these external python based tools are being provided to the community via NCAR Github repositories.

Model Input Data

The input data necessary to run all supported component sets is made available from a public Subversion input data repository. Note that the inputdata repository has much more data in it than you need to run CESM ---- **DO NOT attempt to svn checkout the whole input data repository**. The CIME User's Guide explains how to obtain the subset of input data required for your needs.

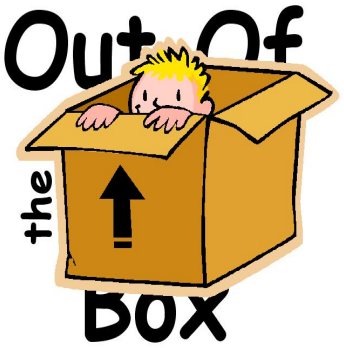
Hardware/Software Requirements

- **Supported platforms**

CESM2.0 currently runs "out of the box" today on the following machines

- **cheyenne – NCAR SGI**
- **yellowstone – NCAR IBM**
- **hobart – NCAR medium sized Linux cluster**
- **edison / cori – NERSC Cray XC**
- **pleiades – NASA SGI ICE cluster**

Always review the model version release notes and DiscussCESM Forums for up-to-date machine specific issues.



out of the box = works immediately after installation without any modification

- **Running CESM2.0 on other platforms**

Require porting + software

- **Subversion client (version 1.8 or greater)**
- **python 2.7 and perl 5**
- **Fortran and C compilers (recommend pgi, intel, or gnu compilers)**
- **NetCDF library (recommend netcdf4.4 or later)**
- **pnetcdf**
- **MPI (MPI1 is adequate, Open MPI or MPICH seem to work on Linux clusters)**
- **CMake**

Basic Work Flow

(*or how to set up and run an experiment*)

- **One-Time Setup Steps**

  (A) Registration

  (B) Download the CESM code

  (C) Create an Input Data Root Directory

  (D) Porting

- **Creating & Running a Case**

  (1) Create a New Case

  (2) Invoke case.setup

  (3) Build the Executable

  (4) Run the Model and Output Data Flow

(A) Registration

http://www.cesm.ucar.edu/models/register/register.html

Please register as an individual CESM user even if your institution has a common installation of CESM.

CESM Release User Registration

* Required Fields

Last Name:*

First Name:*

E-Mail:*

Institution:*

City:*

Country:* Select

Purpose:*

Valid special characters to use: . period, - hyphen, ' apostrophe, / forward slash, : colon, , commas. No additional special characters are allowed.

(Maximum characters: 400) You have 400 characters left.

Have you used previous versions of CCSM/CESM?* Yes No

Publications using previous versions of CCSM/CESM:

If you have used previous versions of CCSM/CESM, please provide publications you have using the code.
Valid special characters to use: . period, - hyphen, ' apostrophe, / forward slash, : colon, , commas. No additional special characters are allowed.

Basic Work Flow

(*or how to set up and run an experiment*)

- **One-Time Setup Steps**
  - **(A) Registration**
  - **(B) Download the CESM code**
  - **(C) Create an Input Data Root Directory**
  - **(D) Porting**

- **Creating & Running a Case**
  - **(1) Create a New Case**
  - **(2) Invoke case.setup**
  - **(3) Build the Executable**
  - **(4) Run the Model and Output Data Flow**

(B) Download the Source Code

- **Code and input datasets are in Subversion repositories (*)**

https://svn-ccsm-release.cgd.ucar.edu/model_versions

https://svn-ccsm-models.cgd.ucar.edu/cesm1/release_tags

- **List the versions available on the CESM repository**

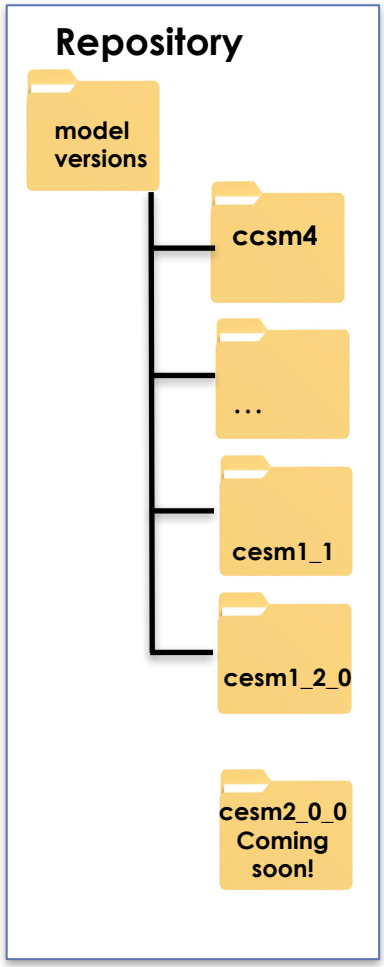
svn list https://svn-ccsm-models.cgd.ucar.edu/cesm1/release_tags

- **Check out a working copy from the repository ("Download code")**

svn co https://svn-ccsm-models.cgd.ucar.edu/cesm1/release_tags/cesm1_2_2_1

- **NOTE: For CESM2 (when it is released) the svn command will be:**

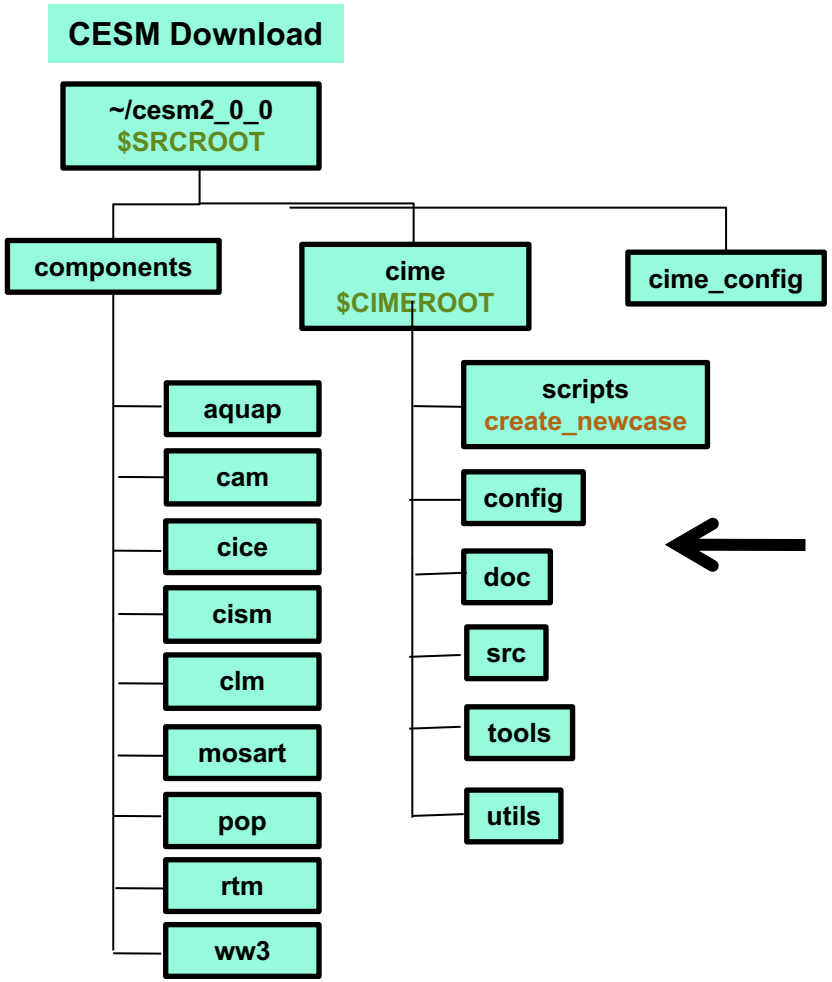
svn co https://svn-ccsm-models.cgd.ucar.edu/cesm2/release_tags/cesm2_0_0



(*) You can get subversion at http://subversion.apache.org/

open source

Overview of Directories (after initial model download)

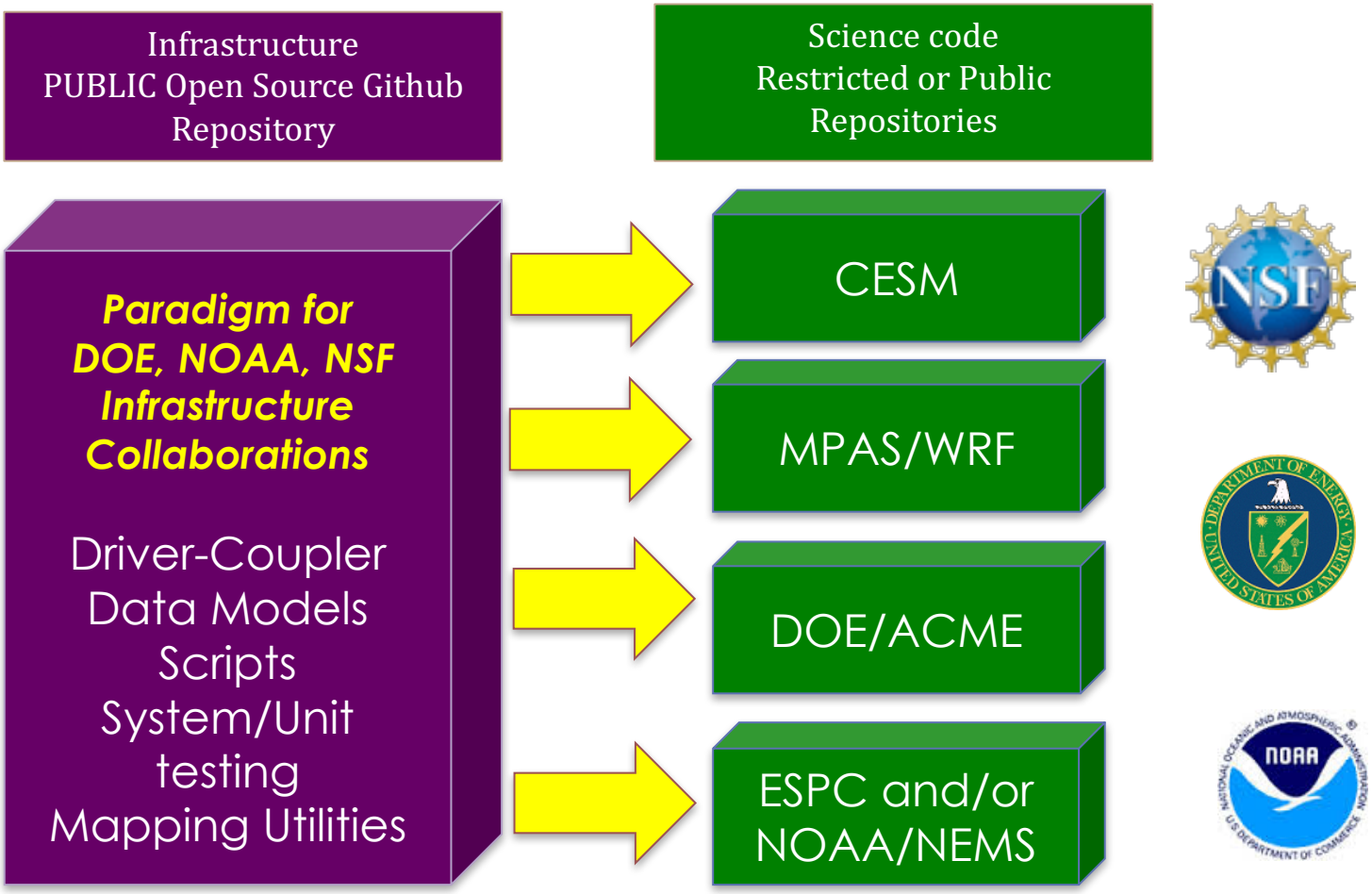


The CESM2 source root contains 3 important directories: components, cime, and cime_config

New in CESM2 - CIME (pronounced "SEAM")
Separates the model infrastructure from the prognostic or "active" model components. This separation allows the option to "plug-and-play" different component models.
Github Public Repository:
http://github.com/ESMCI/cime

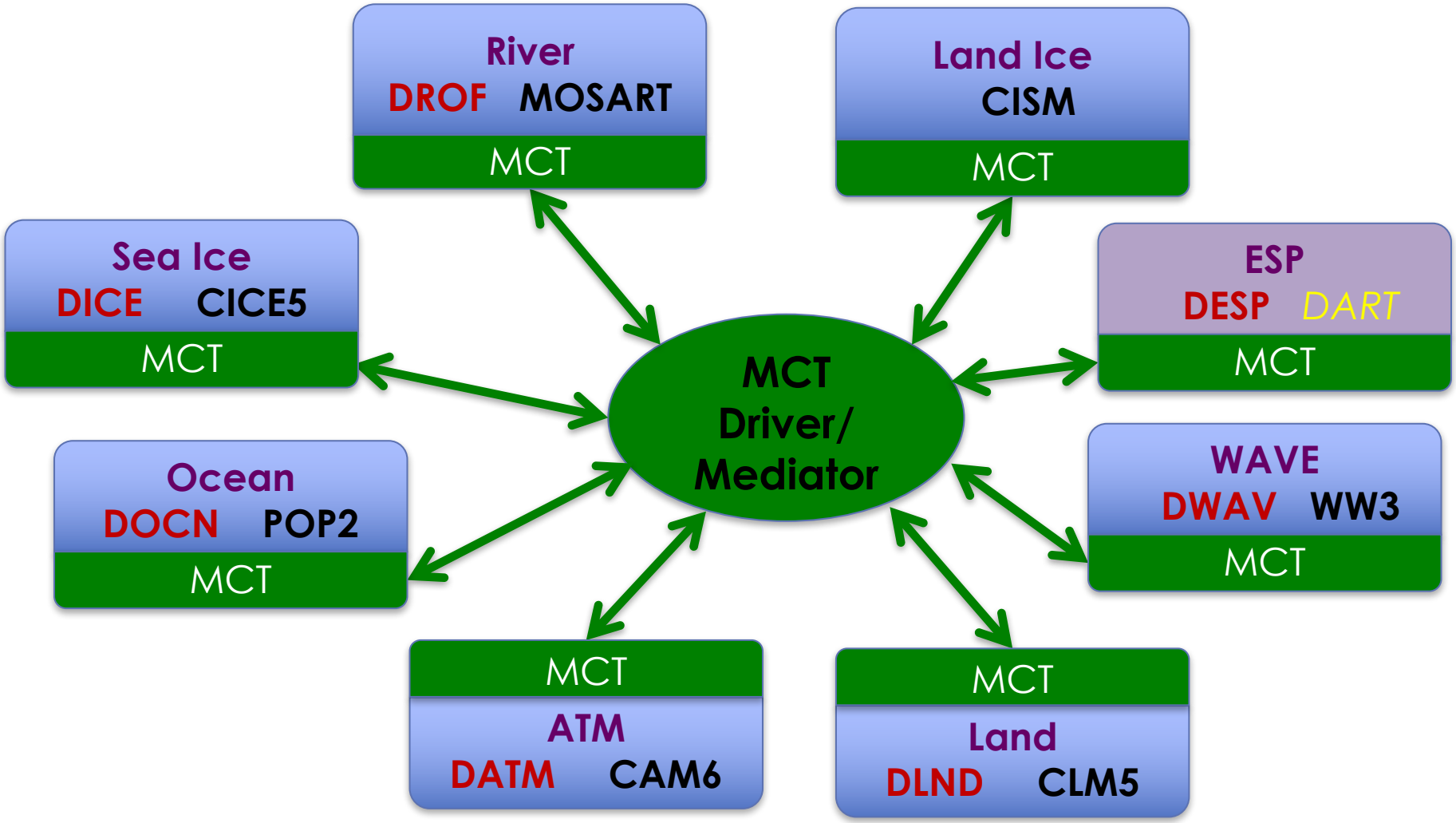
Coupling Infrastructure for Modeling Earth (CIME)

(new python-based CESM infrastructure)



addresses needs of multiple efforts

Current CESM2 Coupling – data components permit flexible activation/deactivation of feedbacks



MCT – Model Coupling Toolkit

CIME Documentation
http://esmci.github.io/cime

For software engineers:

CIME uses XML files as the data store for configuration and variable settings and a set of python modules to parse those XML files and create an experiment case specific environment for setup, build, and batch submission.

CIME documentation

The Common Infrastructure for Modeling the Earth (CIME - pronounced "SEAM") provides a UNIX command-line-based interface for configuring, compiling and executing Earth system models.

Table of contents

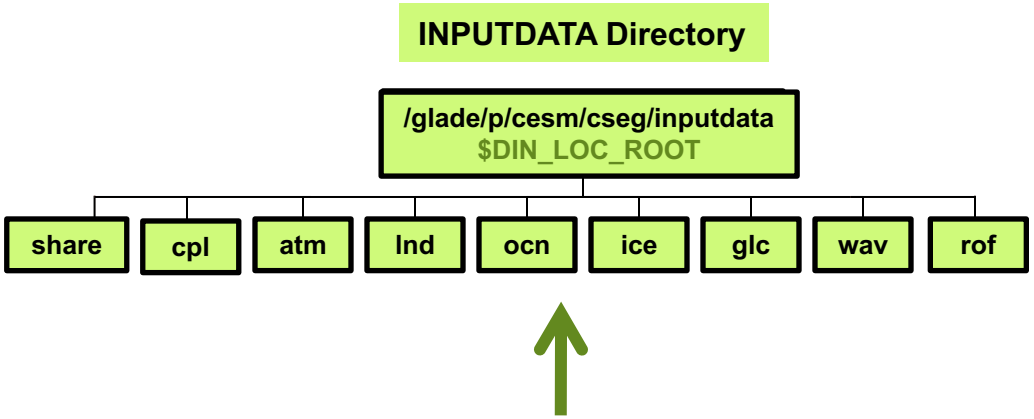
Basic Work Flow

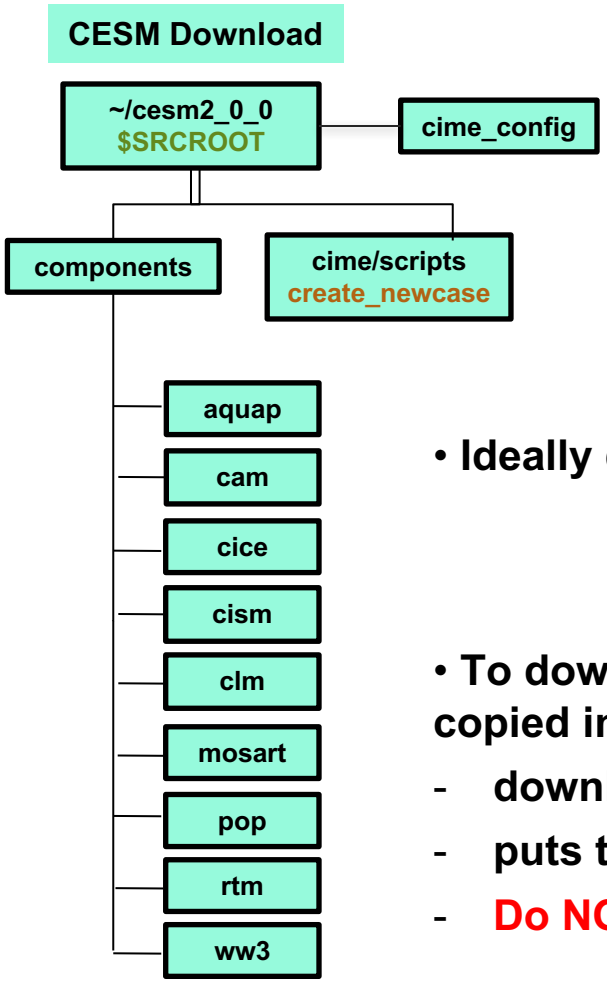
(*or how to set up and run an experiment*)

- **One-Time Setup Steps**
  - **(A) Registration**
  - **(B) Download the CESM code**
  - **(C) Create an Input Data Root Directory**
  - **(D) Porting**

- **Creating & Running a Case**
  - **(1) Create a New Case**
  - **(2) Invoke case.setup**
  - **(3) Build the Executable**
  - **(4) Run the Model and Output Data Flow**

Overview of Directories (+ inputdata directory)





Inputdata directory $DIN_LOC_ROOT
contains all input data required to run the model

- on supported machines - populated inputdata already exists
- on non-supported machines - need to create inputdata directory root

• Ideally directory is shared by a group of users to save disc space

• To download input data: use the script check_input_data which is copied into every caseroot directory.

- downloads only the data needed
- puts the data in the proper subdirectories
- Do NOT download input data manually (ie. by using svn co)

Basic Work Flow

(*or how to set up and run an experiment*)

- **One-Time Setup Steps**
  - **(A) Registration**
  - **(B) Download the CESM code**
  - **(C) Create an Input Data Root Directory**
  - **(D) Porting**

- **Creating & Running a Case**
  - **(1) Create a New Case**
  - **(2) Invoke case.setup**
  - **(3) Build the Executable**
  - **(4) Run the Model and Output Data Flow**

(D) Porting

Porting details will be covered in Wednesday's 1:00 p.m. lecture

CIME Documentation Part 2 – http://esmci.github.io/cime/

- On supported machines - no porting is necessary

- On new machines - porting needs to be done

From the CESM2 webpage:

NCAR's Experience Porting and Running CESM2 on a Medium-sized Linux Cluster

NCAR typically runs CESM on large super-computers with 4096 cores on yellowstone and 2160 cores on cheyenne. However, we also port, run and regularly tested CESM on a more moderately-sized Linux cluster.

NCAR's Climate and Global Dynamics (CGD) division maintains a medium-size Linux cluster called **hobart** to support research and development.

This page details our experiences on **hobart** that might help other institutions port and run CESM2 on their Linux clusters.

*** NOTE *** This is for information purposes only. Please use the DiscussCESM forums to post your questions regarding porting and running on your particular Linux cluster.

Linux Cluster Hardware Specifications

Single login node with the following specifications:

Hostname :	**hobart**
Operating System :	CentOS Linux release 7.2.1511 (Core) x86_64
Kernal :	3.10.0-327.el7.x86_64
Processor(s) :	16 X Intel(R) Xeon(R) CPU W5580 @ 3.20GHz
CPU MHz :	3192.072
Total Memory :	74.05 GB
Total Swap :	1.04 GB

32 compute nodes with the following specifications for each node:

Operating System :	CentOS Linux release 7.2.1511 (Core) x86_64
Kernal :	3.10.0-327.el7.x86_64
Processor(s) :	48 X Intel(R) Xeon(R) CPU ES-2670 v3 @ 2.30GHz
CPU MHz :	23000.000
Total Memory :	98.59 GB
Total Swap :	1.04 GB

Available shared disk space for run and build directories :
5.0 T

Basic Work Flow

(*or how to set up and run an experiment*)

- **One-Time Setup Steps**
  - **(A) Registration**
  - **(B) Download the CESM code**
  - **(C) Create an Input Data Root Directory**
  - **(D) Porting**

- **Creating & Running a Case**
  - **(1) Create a New Case**
  - **(2) Invoke case.setup**
  - **(3) Build the Executable**
  - **(4) Run the Model and Output Data Flow**

Work Flow: Super Quick Start

CESM2 can be run with a set of 4 commands

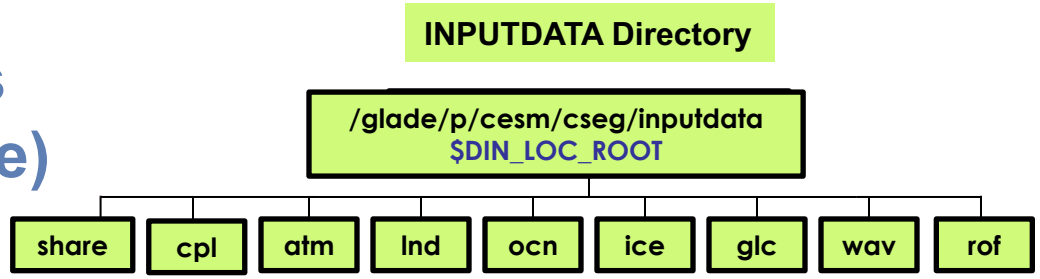
Set of commands to build and run the model on a supported machine

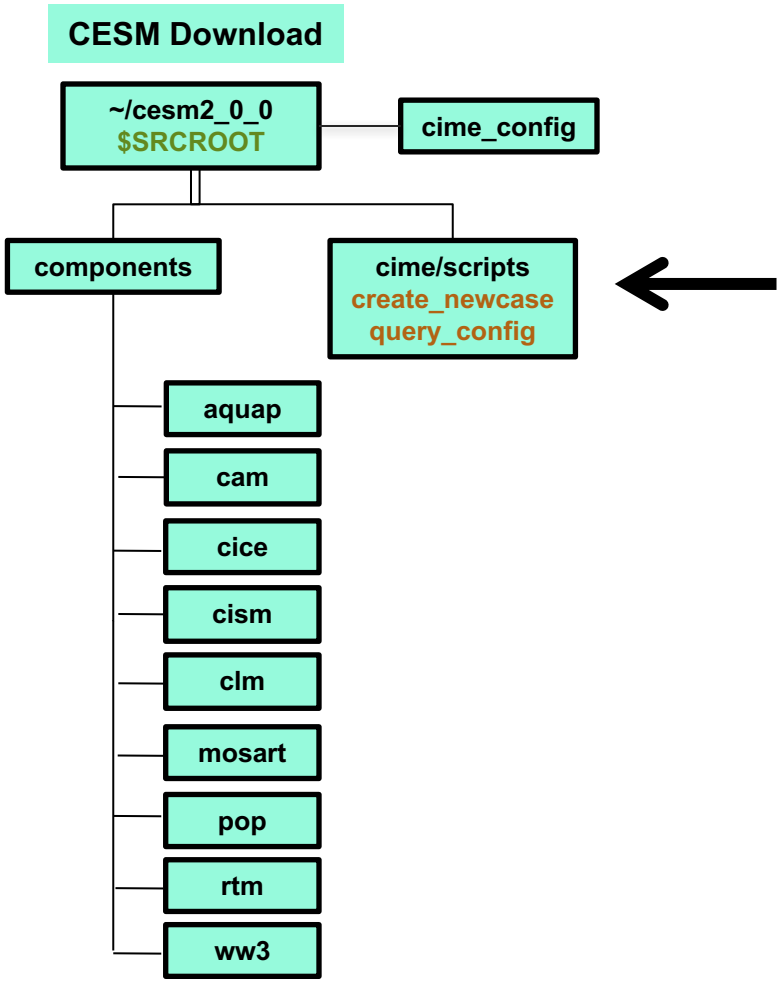
```
# one time step
mkdir ~/cases

# go into scripts directory into the source code download
cd /glade/p/cesm/tutorial/cesm2_0_alpha07c/cime/scripts

# (1) create a new case in the directory "cases" in your home directory
./create_newcase --case ~/cases/b.day1.0 --res f19_g17 --compset B1850

# go into the case you just created in the last step
cd ~/cases/b.day1.0

# (2) invoke case.setup
./case.setup

# (3) build the executable
./case.build

# (4) submit your run to the batch queue
./case.submit
```

(1) (2) (3) (4)

It is that easy !

Overview of Directories (+ before create_newcase)





This is the script you need to create a new case

create_newcase --help

Helper script query_config allows you to view the available XML configuration settings.

query_config --help

Work Flow: Super Quick Start

Set of commands to build and run the model on a supported machine

```
# one time step
mkdir ~/cases

# go into scripts directory into the source code download
cd /glade/p/cesm/tutorial/cesm2_0_alpha07c/cime/scripts

# (1) create a new case in the directory “cases” in your home directory
./create_newcase --case ~/cases/b.day1.0 --res f19_g17 --compset B1850

# go into the case you just created in the last step
cd ~/cases/b.day1.0/

# (2) invoke case.setup
./case.setup

# (3) build the executable
./case.build

# (4) submit your run to the batch queue
./case.submit
```

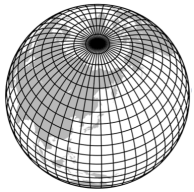
(1) Create a new case

In the scripts directory, create_newcase is the tool that generates a new case.

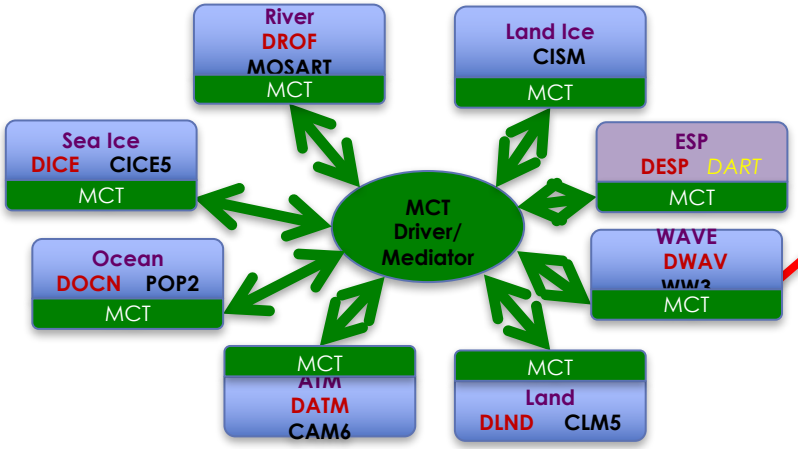
create_newcase requires 3 arguments

What is the casename ?

Which resolution?



Which model configuration ? Which set of components ?



Which machine are you running on?

NOTE: CESM2 no longer requires the --mach argument when running on supported machines.

(1) create_newcase arguments

create_newcase requires 3 arguments

```
create_newcase --case ~/cases/b.day1.0 --res f19_g17 --compset B1850
```

NOTE: for all user scripts, you can run the script name followed by the --h or –-help argument to see help documentation and a list of all command line arguments.

NOTE: Double dashes "--" are now required with command line arguments!

(1) create_newcase arguments

create_newcase requires 3 arguments

```
create_newcase --case ~/cases/b.day1.0 –res f19_g17 --compset B1850
```

What is the casename ?

case specifies the name and location of the case being created ~/cases/b.day1.0

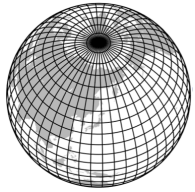
NOTE: experiment case naming conventions for CESM are described on the CESM2 webpage at URL: http://www.cesm.ucar.edu/models/cesm2.0/cesm/casename_conventions_cesm.html

(1) create_newcase arguments

create_newcase requires 3 arguments

create_newcase --case ~/cases/b.day1.0 –res f19_g17 --compset B1850

Which resolution?



res specifies the model resolution (or grid)

New grid naming convention

Each model resolution can be specified by its alias or long name.

Example of equivalent alias and long name:
- alias: f19_g17 (atm/lnd_ocn/ice)
- long name: a%1.9x2.5_l%1.9x2.5_oi%gx1v7_r%r05_g%gland4_w%ww3a_m%gx1v7

atm | **lnd** | **ocn/ice grid** | **river** | **lnd-ice** | **wave** | **ocn-ice mask**

CESM2 Supported Grid Definitions

http://www.cesm.ucar.edu/models/cesm2.0/cesm/grids.html

$CIMEROOT/scripts/query_config –grids --long

Grid Resolution Definitions

Model Version: CESM2.0

HTML created on: 2017-05-12

This page contains the complete list of grid resolution short and descriptions.
They are grouped by alias names designed to aid browsing.
Clicking on the blue text will display additional descriptive information.
Click on the **"Show Details"** button and then cntl+F key to search for specific strings in this file.

Show Details | Hide Details

Grid Naming Convention

Default Component Grids

Grid Alias: 1D_1D (only for compsets that are DATM.+DROF)

Grid Alias: 1x1_brazil (only for compsets that are DATM.+CLM)

Grid Alias: 1x1_camdenNJ (only for compsets that are DATM.+CLM)

Grid Alias: 1x1_mexicocityMEX (only for compsets that are DATM.+CLM)

Grid Alias: 1x1_numaIA (only for compsets that are DATM.+CLM)

Grid Alias: 1x1_smallvilleIA (only for compsets that are DATM.+CLM)

Grid Alias: 1x1_tropicAtl (only for compsets that are DATM.+CLM)

Grid Alias: 1x1_urbanc_alpha (only for compsets that are DATM.+CLM)

Grid Alias: 1x1_vancouverCAN (only for compsets that are DATM.+CLM)

Grid Alias: 5x5_amazon (only for compsets that are DATM.+CLM)

```
                non-default grids are: atm:5x5_amazon  lnd:5x5_amazon  rof:null

      5x5 Amazon regional case -- only valid for DATM/CLM compset with domain file(s):
      $DIN_LOC_ROOT/share/domains/domain.clm/domain.lnd.5x5pt-amazon_navy.090715.nc (only for grid match: atm|lnd)
```

Grid Alias: CLM_USRDAT (only for compsets that are DATM.+CLM)

Grid Alias: T31_g37

Grid Alias: T31_g37_gl10 (only for compsets that are _CISM)

(1) create_newcase arguments

create_newcase requires 3 arguments

create_newcase --case ~/cases/b.day1.0 --res T31_g37 --compset B1850

Which component set ?

compset specifies the "component set"

Component set specifies component models, forcing scenarios and physics options for those models

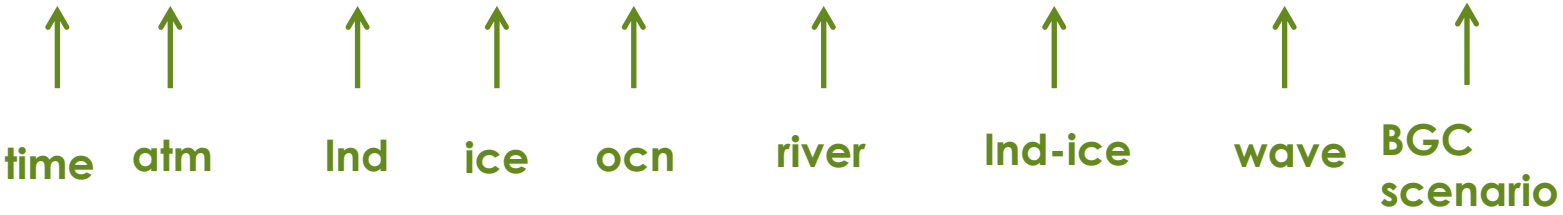
New compset naming convention

Each model compset can be specified by its alias or long name.

Example of equivalent alias, short name and long name:

- alias: B1850

- long name = 1850_CAM60_CLM50%BGC_CICE_POP2%ECO_MOSART_CISM2%NOEVOLVE_WW3_BGC%BDRD



CESM2 Supported Component Set (compset) Definitions

http://www.cesm.ucar.edu/models/cesm2.0/cesm/grids.html

query_config –compsets [{all,allactive,drv,cam,cism,clm,cice,pop,mpas-o}]

Component Set Definitions (compsets)

Model Version: CESM2.0
HTML created on: 2017-06-04

This page contains the complete list of component sets aliases and long names.
They are grouped by model components designed to aid browsing.

Clicking on the name of a component will display additional descriptive information.
Click on the "Show Details" button and then cntl+F key to search for specific strings in this file.

Show Details | Hide Details

Compset Naming Convention

Component: allactive

Alias	Long Name
B1850	1850_CAM60_CLM50%BGC_CICE_POP2%ECO_MOSART_CISM2%NOEVOLVE_WW3_BGC%BDRD
B1850C4L45BGCBPRP	1850_CAM40_CLM45%BGC_CICE_POP2%ECO_MOSART_SGLC_SWAV_BGC%BPRP
B1850C4L45BGCRBPRP	1850_CAM40_CLM45%BGC_CICE_POP2%ECO_RTM_SGLC_SWAV_BGC%BPRP
B1850C5L45BGC	1850_CAM50_CLM45%BGC_CICE_POP2_MOSART_SGLC_SWAV
B1850C5L45BGCR	1850_CAM50_CLM45%BGC_CICE_POP2_RTM_SGLC_SWAV
B1850C5L45BGCRBPRP	1850_CAM50_CLM45%BGC_CICE_POP2%ECO_RTM_SGLC_SWAV_BGC%BPRP
B1850C5L45BGCRG	1850_CAM50_CLM45%BGC_CICE_POP2_RTM_CISM2_SWAV
B1850C5L45BGCRG1	1850_CAM50_CLM45%BGC_CICE_POP2_RTM_CISM1_SWAV
B1850Ws	1850_CAM60_CLM50%BGC_CICE_POP2%ECO_MOSART_CISM2%NOEVOLVE_SWAV_BGC%BDRD
BC5L45BGC	2000_CAM50_CLM45%BGC_CICE_POP2_MOSART_SGLC_SWAV
BC5L45BGCR	2000_CAM50_CLM45%BGC_CICE_POP2_RTM_SGLC_SWAV
BC5L45BGCRG	2000_CAM50_CLM45%BGC_CICE_POP2_RTM_CISM2_SWAV
BHIST	HIST_CAM60_CLM50%BGC_CICE_POP2%ECO_MOSART_CISM2%NOEVOLVE_WW3_BGC%BDRD
BHISTWs	HIST_CAM60_CLM50%BGC_CICE_POP2%ECO_MOSART_CISM2%NOEVOLVE_SWAV_BGC%BDRD
BRCP85C5L45BGC	RCP8_CAM50_CLM45%BGC_CICE_POP2_MOSART_SGLC_SWAV
BRCP85C5L45BGCR	RCP8_CAM50_CLM45%BGC_CICE_POP2_RTM_SGLC_SWAV
BW1850	1850_CAM60%WCTS_CLM50%BGC_CICE_POP2%ECO_MOSART_CISM2%NOEVOLVE_WW3
Bi1850C5	1850_CAM50%WISOall_CLM40%SP-WISO_CICE%WISO_POP2%ISO_RTM%WISO_SGLC_SWAV
Bi1850C5CN	1850_CAM50%WISOall_CLM40%CN-WISO_CICE%WISO_POP2%ISO_RTM%WISO_SGLC_SWAV
BiHISTC5CN	HIST_CAM50_CLM40%CN-WISO_CICE%WISO_POP2%ISO_RTM%WISO_SGLC_SWAV
BiHISTC5CN5	HIST_CAM5_CLM50%CN-WISO_CICE%WISO_POP2%ISO_RTM%WISO_SGLC_SWAV
E1850C5L45TEST	1850_CAM50_CLM45%SP_CICE_DOCN%SOM_MOSART_SGLC_SWAV_TEST
ETEST	2000_CAM60_CLM50_CICE_DOCN%SOM_MOSART_SGLC_SWAV_TEST
J1850G	1850_DATM%CRU_CLM50%BGC_CICE_POP2_MOSART_CISM2_SWAV

Component: cam

Component: cice

Compset Mode Descriptions

The modes define options for the different component models using a python regular expression syntax for matching when creating a new case.

Mode	Description
%ADIAB	CAM adiabatic physics:
%CCTS[%_]	CAM-Chem troposphere / stratosphere chemistry with simplified volatility basis set SOA scheme and modal aersols :
%CLB[%_]	CAM CLUBB:
%DABIP04	CAM dry adiabatic baroclinic instability (Polvani 2004):
%DCTBM	CAM dynamical core test with baroclinic wave IC and terminator chemistry:
%HS94	CAM Held-Suarez forcing:
%KESSLER	CAM dynamical core test with baroclinic wave IC and Kessler physics:
%PM[%_]	CAM prescribed modal aerosols:
%PORT	CAM Parallel Offline Radiation Tool:
%RCO2[%_]	CAM CO2 ramp:
%SPCAMCLBM	CAM super-parameterized CAM double moment m2005 SAM microphysics using CLUBB
%SPCAMCLBS	CAM super-parameterized CAM one moment SAM microphysics using CLUBB
%SPCAMM	CAM super-parameterized CAM double moment m2005 SAM microphysics
%SPCAMS	CAM super-parameterized CAM one moment SAM microphysics
%TMOZ[%_]	CAM tropospheric chemistry with bulk aerosols:
%WCCM[%_]	CAM WACCM with middle atmosphere chemistry:
%WCSC[%_]	CAM WACCM specified chemistry:
%WCTS[%_]	CAM WACCM with tropospheric, stratospheric, mesospheric, and lower thermospheric chemistry:
%WXIE[%_]	CAM WACCM-X enhanced

Result of running create_newcase

./create_newcase --case ~/cases/b.day1.0 --res f19_g17 --compset B1850

```
[aliceb@cheyenne5:scripts]>./create_newcase --case ~/cases/b.day1.0 --res f19_g17 --compset B1850
Compset longname is 1850_CAM60_CLM50%BGC-CROP_CICE_POP2%ECO_MOSART_CISM2%NOEVOLVE_WW3_BGC%BDRD
Compset specification file is /glade/p/work/aliceb/sandboxes/dev/cesm2_0_alpha07/cime/../cime_config/config_compsets.xml
Compset forcing is 1850
Com forcing is Biogeochemistry intercomponent
ATM component is CAM cam6 physics:
LND component is clm5.0 bgc with prognostic crop:
ICE component is prognostic cice:
OCN component is POP2 default:POP2/Ecosystem:
ROF component is MOSART:
GLC component is cism2:cism ice evolution turned off (this is the standard configuration unless you're explicitly interested
in ice evolution):
WAV component is WW3:
ESP component is
Pes     specification file is /glade/p/work/aliceb/sandboxes/dev/cesm2_0_alpha07/cime/../cime_config/config_pes.xml
Machine is cheyenne
Pes setting: grid match    is a%1.9x2.5.+l%1.9x2.5.+oi%gx1
Pes setting: grid          is a%1.9x2.5_l%1.9x2.5_oi%gx1v7_r%r05_g%gland4_w%ww3a_m%gx1v7
Pes setting: compset       is 1850_CAM60_CLM50%BGC-CROP_CICE_POP2%ECO_MOSART_CISM2%NOEVOLVE_WW3_BGC%BDRD
Pes setting: tasks       is {'NTASKS_ATM': -4, 'NTASKS_ICE': -2, 'NTASKS_CPL': -4, 'NTASKS_LND': -2, 'NTASKS_WAV': -1, 'NTASK
S_ROF': -2, 'NTASKS_OCN': -2, 'NTASKS_GLC': -1}
Pes other settings: {}
 Compset is: 1850_CAM60_CLM50%BGC-CROP_CICE_POP2%ECO_MOSART_CISM2%NOEVOLVE_WW3_BGC%BDRD
 Grid is: a%1.9x2.5_l%1.9x2.5_oi%gx1v7_r%r05_g%gland4_w%ww3a_m%gx1v7
 Components in compset are: ['cam', 'clm', 'cice', 'pop', 'mosart', 'cism', 'ww3', 'sesp', 'cpl', 'dart']

This compset and grid combination is not scientifically supported, however it is used in 7 tests.

Using project from env PROJECT: P93300606
cesm model version found: cesm2_0_alpha07b
 Creating Case directory /glade/u/home/aliceb/cases/b.day1.0
[aliceb@cheyenne5:scripts]>
```

compset info

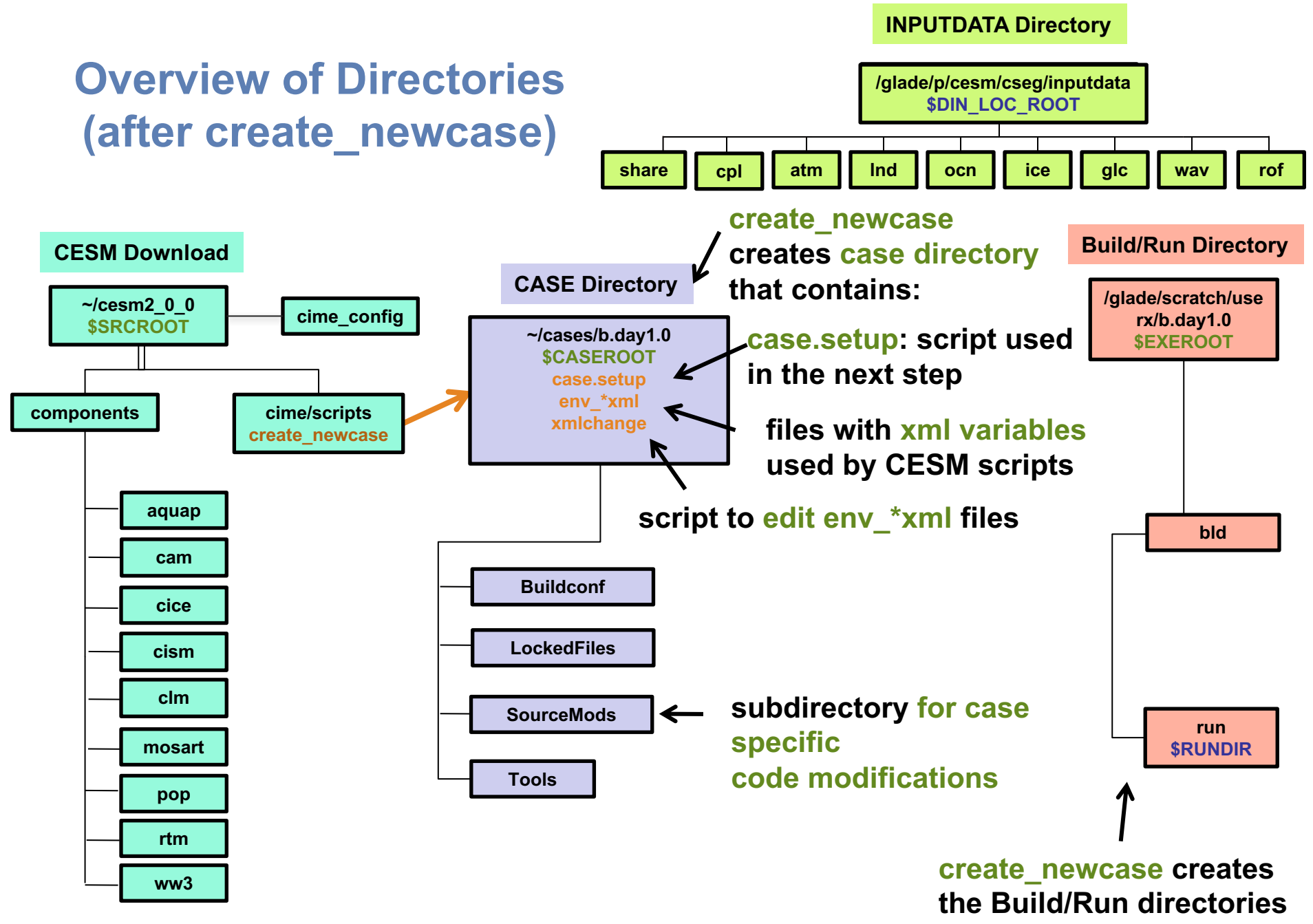
PE layouts

grid info

case location

Success!

Overview of Directories (after create_newcase)



About env_*.xml files

env_*.xml contains variables used by scripts -- some can be changed by the user

- **env_archive.xml: specifies rules for short-term archival script case.st_archive**
- **env_batch.xml: set by create_newcase to define batch specific settings used script case.submit**
- **env_build.xml: specifies build information used by script case.build**
- **env_case.xml: set by create_newcase and cannot be modified**
- **env_mach_pes.xml: specifies PE layout of components used by script case.run**
- **env_mach_specific.xml: specifies machine specific information used by script case.build**
- **env_run.xml: sets run time information (such as length of run, frequency of restarts, …)**

User interacts with this file most frequently

- **To query a variable in an xml file use script xmlquery**
- **To modify a variable in an xml file use script xmlchange**

./xmlchange STOP_N=20

NOTE: You can edit the XML files manually but it is recommended that you use the xmlchange script to ensure that the XML schema is preserved!

$CASEROOT/ xmlchange

```
[aliceb@cheyenne5:b.day1.0]>./xmlchange --help
usage:
xmlchange [<changeargs>] [--verbose][--file file][--id id][--val value][--noecho][--append][--force]
OR
xmlchange --help
OR
xmlchange --test

EXAMPLES:
    # xmlchange REST_OPT=ndays,REST_N=4
    > xmlchange

This utility allows the user to change a env_*xml file via a commandline
interface. The command is echoed to the CaseStatus file, unless -noecho is
given. The purpose of this echoing is to provide a "paper trail" of changes
made by the user, so calls to xmlchange by the cime scripts that are part of
the normal case setup/build process should generally use -noecho.

positional arguments:
  listofsettings        Comma seperated list of settings in the form:
                        var1=value,var2=value,... (default: )

optional arguments:
  -h, --help            show this help message and exit
  -d, --debug           Print debug information (very verbose) to file
                        /glade/u/home/aliceb/cases/b.day1.0/xmlchange.log
                        (default: False)
  -v, --verbose         Add additional context (time and file) to log messages
                        (default: False)
  -s, --silent          Print only warnings and error messages (default:
                        False)
  --caseroot CASEROOT   Case directory to change (default:
                        /glade/u/home/aliceb/cases/b.day1.0)
  -loglevel LOGLEVEL    ignored, backward compatibility only (default: None)
  -file FILE, --file FILE
                        xml file to edit (default: None)
  -id ID, --id ID       the xml entry id (default: None)
  -val VAL, --val VAL   the value to set (default: None)
  -delimiter DELIMITER, --delimiter DELIMITER
                        set delimiter string, default is , (default: ,)
  -dryrun DRYRUN, --dryrun DRYRUN
                        parse settings and print key value pairs only
                        (default: False)
  -noecho, --noecho     do not update CaseStatus with this change (default:
                        False)
  -append, --append     append to the existing value (default: False)
  -subgroup SUBGROUP, --subgroup SUBGROUP
                        apply to this subgroup only (default: None)
  -f, --force           ignore typing checks and store value (default: False)
[aliceb@cheyenne5:b.day1.0]>
```

subgroup – applies change to XML variable in XML element named <group>

Basic Work Flow
(*or how to set up and run an experiment*)

- **One-Time Setup Steps**
  - **(A) Registration**
  - **(B) Download the CESM code**
  - **(C) Create an Input Data Root Directory**
  - **(D) Porting**

- **Creating & Running a Case**
  - **(1) Create a New Case**
  - **(2) Invoke case.setup**
  - **(3) Build the Executable**
  - **(4) Run the Model and Output Data Flow**

Work Flow: Super Quick Start

```
# go into scripts directory into the source code download
cd /glade/p/cesm/tutorial/cesm2_0_alpha07c/cime/scripts

# (1) create a new case in the directory “cases” in your home directory
./create_newcase --case ~/cases/b.day1.0 --res f19_g17 --compset B1850

# go into the case you just created in the last step
cd ~/cases/b.day1.0/

# (2) invoke case.setup
./case.setup

# (3) build the executable
./case.build

# (4) submit your run to the batch queue
./case.submit
```

About case.setup

`./case.setup --help`

```
[aliceb@cheyenne6:b.day1.0]>./case.setup --help
usage:
case.setup [<casedir>] [--verbose] [--clean] [--reset]
OR
case.setup --help
OR
case.setup --test

EXAMPLES:
    # Setup case
    > case.setup

case.setup - create the $caseroot/case.run script and user_nl_xxx component
namelist mod files

positional arguments:
  caseroot              Case directory to setup (default:
                        /glade/u/home/aliceb/cases/b.day1.0)

optional arguments:
  -h, --help            show this help message and exit
  -d, --debug           Print debug information (very verbose) to file
                        /glade/u/home/aliceb/cases/b.day1.0/case.setup.log
                        (default: False)
  -v, --verbose         Add additional context (time and file) to log messages
                        (default: False)
  -s, --silent          Print only warnings and error messages (default: False)
  -c, --clean           Removes the batch run script for target machine.If the
                        testmode argument is present then keep the test script if
                        it is present - otherwise remove it. The user_nl_xxx and
                        Macros files are never removed by case.setup - you must
                        remove them manually (default: False)
  -t, --test-mode       Keeps the test script when the --clean argument is used
                        (default: False)
  -r, --reset           Does a clean followed by setup (default: False)
[aliceb@cheyenne6:b.day1.0]>
```

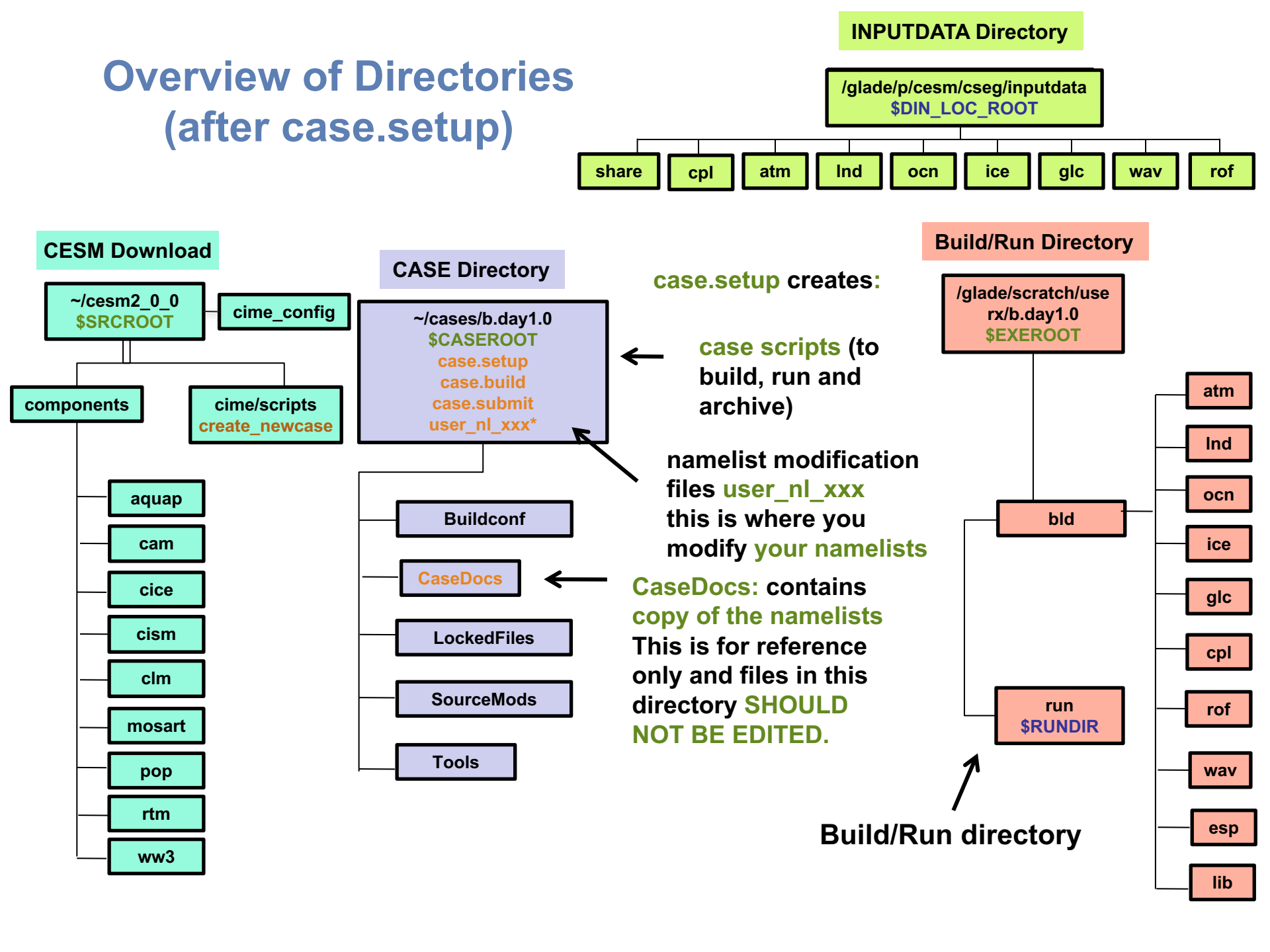
NOTE: changing any of the XML settings in env_mach_pes.xml requires ./case.setup –reset

Calling case.setup

```
[aliceb@cheyenne6:b.day1.0]>./case.setup
/glade/u/home/aliceb/cases/b.day1.0/env_mach_specific.xml already exists, delete to replace
Creating batch script case.run
Writing case.run script from input template /glade/p/work/aliceb/sandboxes/dev/cesm2_0_alpha07/cime/config/cesm/machines/
template.case.run
Writing case.st_archive script from input template /glade/p/work/aliceb/sandboxes/dev/cesm2_0_alpha07/cime/config/cesm/ma
chines/template.st_archive
Locking file env_mach_pes.xml
Creating user_nl_xxx files for components and cpl
If an old case build already exists, might want to run 'case.build --clean' before building
[aliceb@cheyenne6:b.day1.0]>
```

- Create $RUNDIR and $EXEROOT directories
- Create user_nl_xxx files
- Create scripts case.run, case.st_archive
- Create Macros.make file
- Create hidden files .env_mach_specific.* which can help with debugging
- Create CaseDocs directory - NOTE: these files should not be edited!

Overview of Directories (after case.setup)



Basic Work Flow
(*or how to set up and run an experiment*)

- **One-Time Setup Steps**
  - **(A) Registration**
  - **(B) Download the CESM code**
  - **(C) Create an Input Data Root Directory**
  - **(D) Porting**

- **Creating & Running a Case**
  - **(1) Create a New Case**
  - **(2) Invoke case.setup**
  - **(3) Build the Executable**
  - **(4) Run the Model and Output Data Flow**

Work Flow: Super Quick Start

Set of commands to build and run the model on a supported machine: ”cheyenne”

```
# go into scripts directory into the source code download
cd /glade/p/cesm/tutorial/cesm2_0_alpha07c/cime/scripts

# (1) create a new case in the directory “cases” in your home directory
./create_newcase --case ~/cases/b.day1.0 --res f19_g17 --compset B1850CN

# go into the case you just created in the last step
cd ~/cases/b.day1.0/

# (2) invoke case.setup
./case.setup

# (3) build the executable
./case.build

# (4) submit your run to the batch queue
./case.submit
```

Build the Model

- Modifications before build
  - Change env_build.xml values *before* running case.build
  - Introduce any modified source code in SourceMods/ before building
- To completely rebuild, run case.build –clean-all first
- The case.build script
  - Checks for missing input data
  - Builds the individual component libraries and model executable
- If any inputdata is missing,
  - Build aborts, but provides a list of missing files
  - Run ./check_input_data --download to acquire missing data
  - This will use svn to put required data in the inputdata directory
  - Then re-run build script

Running the case.build Script

- Checks for missing input data
- Aborts if any input data is missing

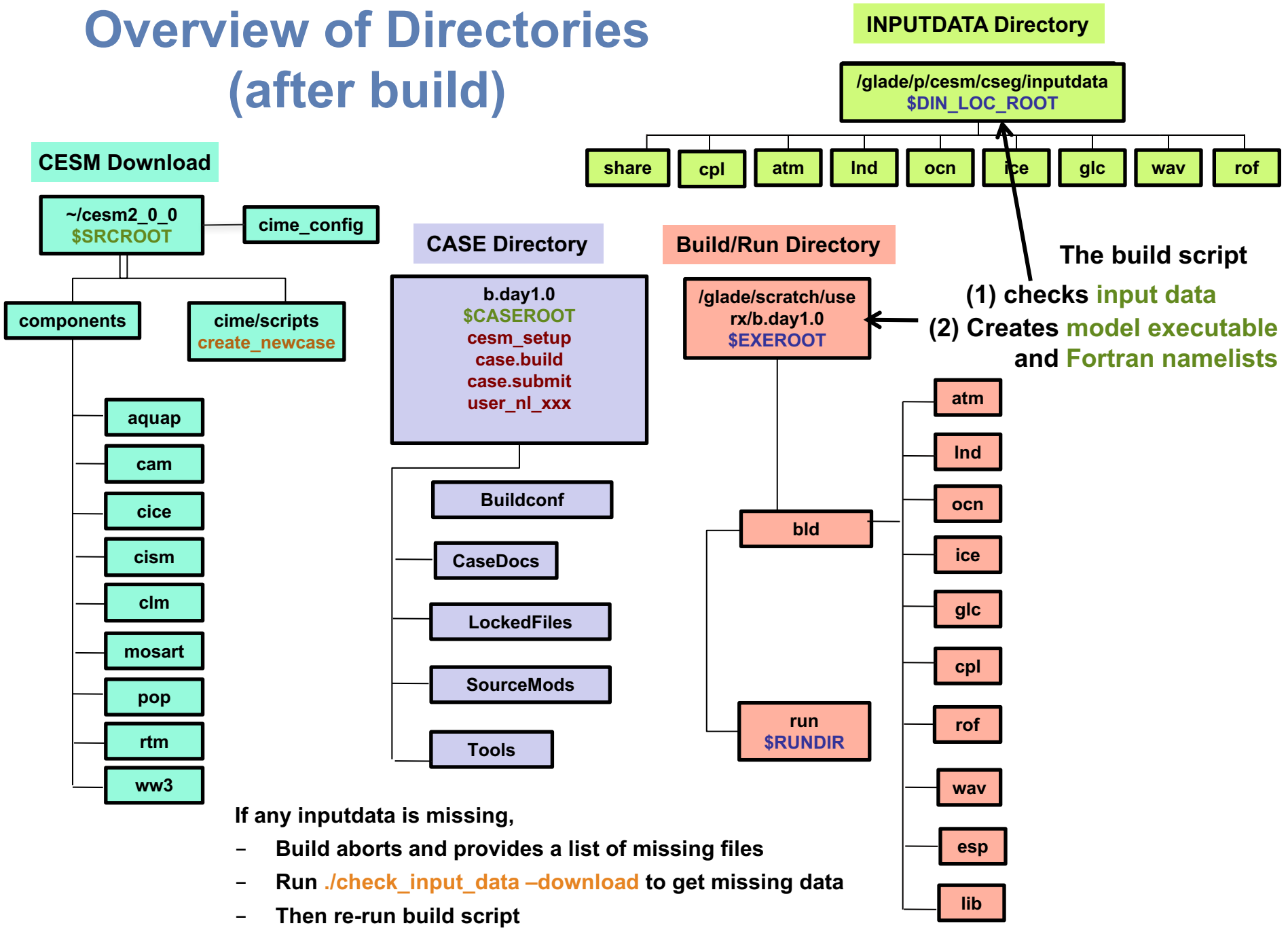
```
[aliceb@cheyenne6:b.day1.0]>./case.build
Building case in directory /glade/u/home/aliceb/cases/b.day1.0
sharedlib_only is False
model_only is False
Generating component namelists as part of build
Creating component namelists
   Calling /glade/p/work/aliceb/sandboxes/dev/cesm2_0_alpha07/components/cam/cime_config/buildnml
     ...calling cam buildcpp to set build time options
   Calling /glade/p/work/aliceb/sandboxes/dev/cesm2_0_alpha07/components/clm/cime_config/buildnml
   Calling /glade/p/work/aliceb/sandboxes/dev/cesm2_0_alpha07/components/cice/cime_config/buildnml
     ...calling cice buildcpp to set build time options
   Calling /glade/p/work/aliceb/sandboxes/dev/cesm2_0_alpha07/components/pop/cime_config/buildnml
     ...calling pop buildcpp to set build time options
   Calling /glade/p/work/aliceb/sandboxes/dev/cesm2_0_alpha07/components/mosart/cime_config/buildnml
   Running /glade/p/work/aliceb/sandboxes/dev/cesm2_0_alpha07/components/cism/cime_config/buildnml

   Calling /glade/p/work/aliceb/sandboxes/dev/cesm2_0_alpha07/components/ww3/cime_config/buildnml
   Calling /glade/p/work/aliceb/sandboxes/dev/cesm2_0_alpha07/cime/src/components/stub_comps/sesp/cime_config/buildnml
   Calling /glade/p/work/aliceb/sandboxes/dev/cesm2_0_alpha07/cime/src/drivers/mct/cime_config/buildnml
Finished creating component namelists
Building gptl with output to file /glade/scratch/aliceb/b.day1.0/bld/gptl.bldlog.170806-153359
Component gptl build complete with 9 warnings
Building mct with output to file /glade/scratch/aliceb/b.day1.0/bld/mct.bldlog.170806-153359
Building pio with output to file /glade/scratch/aliceb/b.day1.0/bld/pio.bldlog.170806-153359
Building csm_share with output to file /glade/scratch/aliceb/b.day1.0/bld/csm_share.bldlog.170806-153359
Component csm_share build complete with 20 warnings
        - Building clm4_5/clm5_0 Library
Building lnd with output to /glade/scratch/aliceb/b.day1.0/bld/lnd.bldlog.170806-153359
Component lnd build complete with 6 warnings
clm built in 175.854338 seconds
Building atm with output to /glade/scratch/aliceb/b.day1.0/bld/atm.bldlog.170806-153359
Building ice with output to /glade/scratch/aliceb/b.day1.0/bld/ice.bldlog.170806-153359
Building ocn with output to /glade/scratch/aliceb/b.day1.0/bld/ocn.bldlog.170806-153359
Building rof with output to /glade/scratch/aliceb/b.day1.0/bld/rof.bldlog.170806-153359
Building glc with output to /glade/scratch/aliceb/b.day1.0/bld/glc.bldlog.170806-153359
Building wav with output to /glade/scratch/aliceb/b.day1.0/bld/wav.bldlog.170806-153359
Building esp with output to /glade/scratch/aliceb/b.day1.0/bld/esp.bldlog.170806-153359
sesp built in 1.308876 seconds
ww built in 154.859285 seconds
mosart built in 154.860462 seconds
Component ice build complete with 1 warnings
cice built in 427.852719 seconds
Component atm build complete with 14 warnings
Component glc build complete with 3 warnings
Component ocn build complete with 4 warnings
pop built in 504.055526 seconds
cism built in 504.055353 seconds
cam built in 504.059419 seconds
Building cesm with output to /glade/scratch/aliceb/b.day1.0/bld/cesm.bldlog.170806-153359
Time spent not building: 15.649067 sec
Time spent building: 862.840315 sec
[aliceb@cheyenne6:b.day1.0]>
```

Namelist creation

Model Build

Success

Overview of Directories (after build)



If any inputdata is missing,

- Build aborts and provides a list of missing files
- Run ./check_input_data –download to get missing data
- Then re-run build script

Basic Work Flow

(*or how to set up and run an experiment*)

- **One-Time Setup Steps**
  - **(A) Registration and Download**
  - **(B) Create an Input Data Root Directory**
  - **(C) Porting**

- **Creating & Running a Case**
  - **(1) Create a New Case**
  - **(2) Invoke cesm_setup**
  - **(3) Build the Executable**
  - **(4) Run the Model and Output Data Flow**

Work Flow: Super Quick Start

Set of commands to build and run the model on a supported machine: ”cheyenne”

```
# go into scripts directory into the source code download
cd /glade/p/cesm/tutorial/cesm2_0_alpha07c/cime/scripts

# (1) create a new case in the directory “cases” in your home directory
./create_newcase --case ~/cases/b.day1.0 --res f19_g17 --compset B1850CN

# go into the case you just created in the last step
cd ~/cases/b.day1.0/

# (2) invoke case.setup
./case.setup

# (3) build the executable
./case.build

# (4) submit your run to the batch queue
./case.submit
```

(4) Running the Model

```
[aliceb@cheyenne6:b.day1.0]>./xmlquery DOUT_S
        DOUT_S: TRUE
[aliceb@cheyenne6:b.day1.0]>./xmlquery STOP_N,STOP_OPTION

Results in group run_begin_stop_restart
        STOP_N: 5
        STOP_OPTION: ndays
[aliceb@cheyenne6:b.day1.0]>./case.submit
Creating component namelists
   Calling /glade/p/work/aliceb/sandboxes/dev/cesm2_0_alpha07/components/cam/cime_config/buildnml
   Calling /glade/p/work/aliceb/sandboxes/dev/cesm2_0_alpha07/components/clm/cime_config/buildnml
   Calling /glade/p/work/aliceb/sandboxes/dev/cesm2_0_alpha07/components/cice/cime_config/buildnml
   Calling /glade/p/work/aliceb/sandboxes/dev/cesm2_0_alpha07/components/pop/cime_config/buildnml
   Calling /glade/p/work/aliceb/sandboxes/dev/cesm2_0_alpha07/components/mosart/cime_config/buildnml
   Running /glade/p/work/aliceb/sandboxes/dev/cesm2_0_alpha07/components/cism/cime_config/buildnml

   Calling /glade/p/work/aliceb/sandboxes/dev/cesm2_0_alpha07/components/ww3/cime_config/buildnml
   Calling /glade/p/work/aliceb/sandboxes/dev/cesm2_0_alpha07/cime/src/components/stub_comps/sesp/cime_config/buildnml
   Calling /glade/p/work/aliceb/sandboxes/dev/cesm2_0_alpha07/cime/src/drivers/mct/cime_config/buildnml
Finished creating component namelists
Checking that inputdata is available as part of case submission
Loading input file list: 'Buildconf/clm.input_data_list'
Loading input file list: 'Buildconf/cpl.input_data_list'
Loading input file list: 'Buildconf/pop.input_data_list'
Loading input file list: 'Buildconf/ww3.input_data_list'
Loading input file list: 'Buildconf/cice.input_data_list'
Loading input file list: 'Buildconf/cism.input_data_list'
Loading input file list: 'Buildconf/mosart.input_data_list'
Loading input file list: 'Buildconf/cam.input_data_list'
Check case OK
submit_jobs case.run
job is case.run
Submit job case.run
Submitting job script qsub    -q regular -l walltime=12:00:00 -A P93300606 case.run
Submitted job id is 1563681.chadmin1
job is case.st_archive
Submit job case.st_archive
Submitting job script qsub    -q regular -l walltime=12:00:00 -A P93300606  -W depend=afterok:1563681.chadmin1 case.st_archive
Submitted job id is 1563682.chadmin1
Submitted job case.run with id 1563681.chadmin1
Submitted job case.st_archive with id 1563682.chadmin1
[aliceb@cheyenne6:b.day1.0]>qstat -u aliceb

chadmin1:
                                                            Req'd  Req'd   Elap
Job ID          Username Queue    Jobname    SessID NDS TSK Memory Time  S Time
--------------- -------- -------- ---------- ------ --- --- ------ ----- - -----
1563681.chadmin aliceb   regular  b.day1.0.r  52980   6 216    --   12:00 R 00:00
1563682.chadmin aliceb   regular  b.day1.0.s     --    1  36    --   12:00 H   --
[aliceb@cheyenne6:b.day1.0]>
```

Check archive and Run options

Check if namelists need to be rebuilt

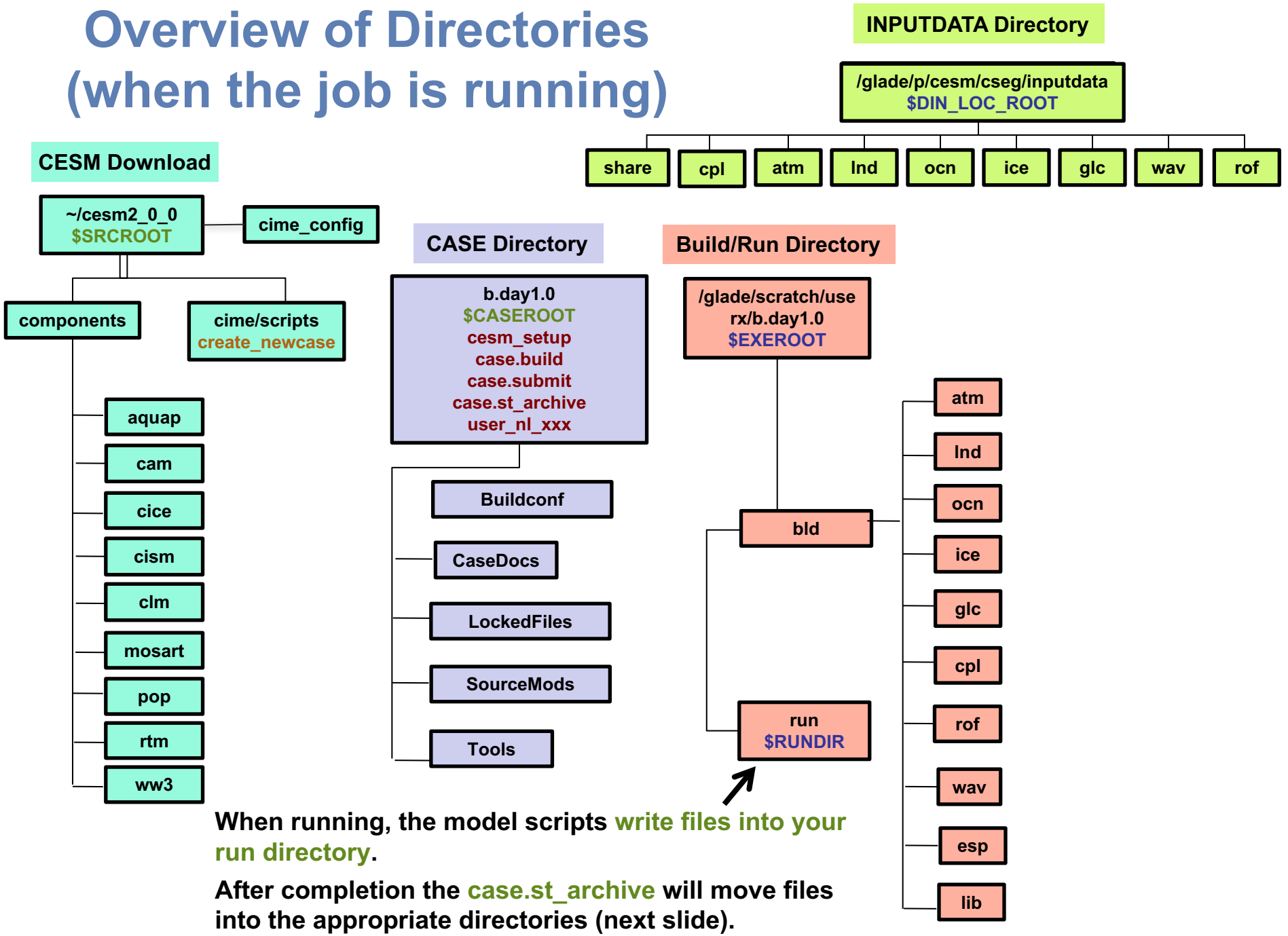
Load the initial input data

Submit case.run

Submit case.st_archive dependent on the successful completion of case.run

Batch job status qstat –u aliceb

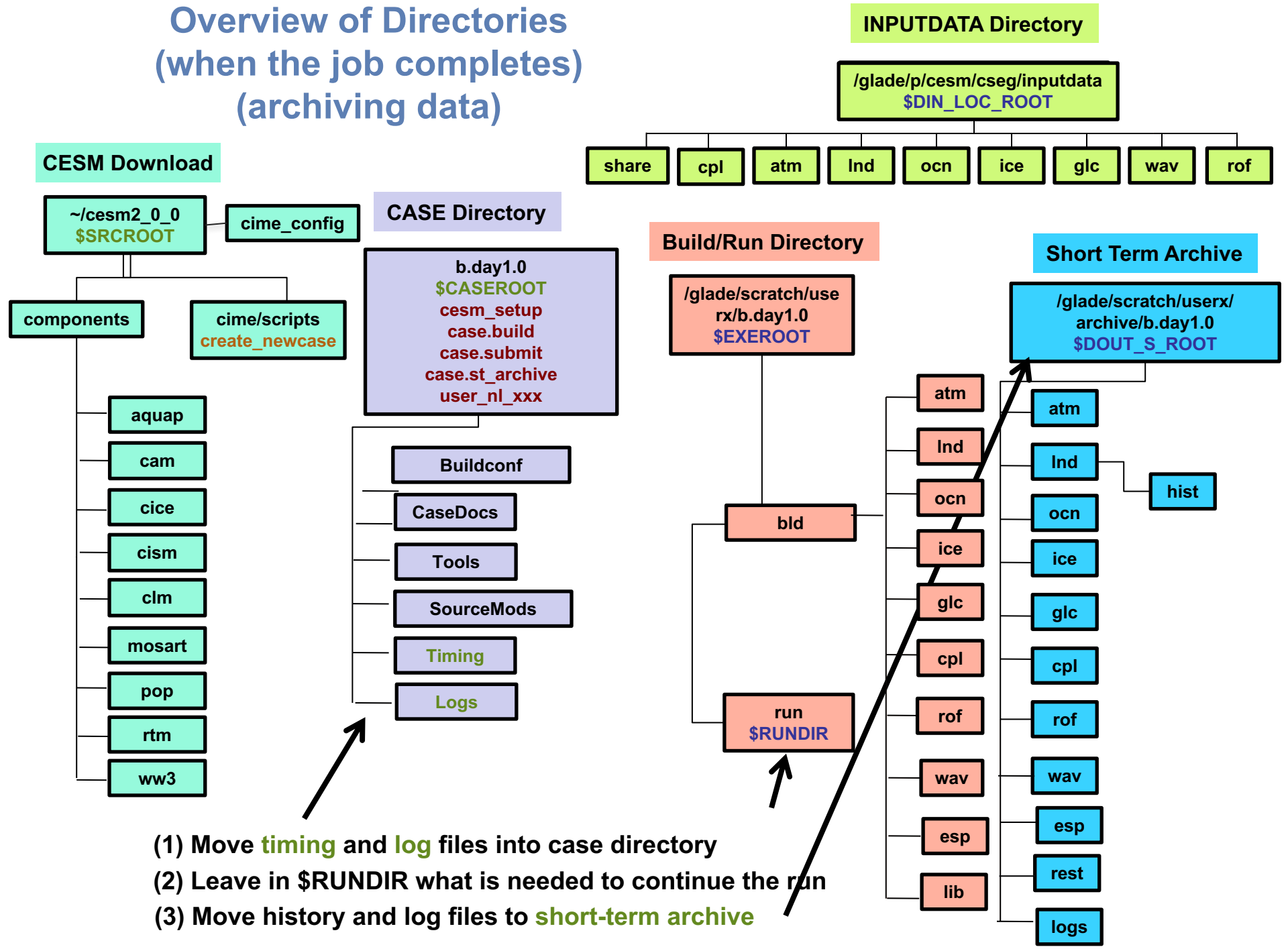
Overview of Directories (when the job is running)



When running, the model scripts write files into your run directory.

After completion the case.st_archive will move files into the appropriate directories (next slide).

Overview of Directories (when the job completes) (archiving data)



Expert feature: create_clone

- The “create_clone” tool copies an existing case to make a new copy.
- Things that are copied:
  - Most (not all) env_*.xml settings.
  - user_nl_xxx files
  - Macros
  - SourceMods
  - Batch system files
  - README.case
- Not copied:
  - Logs
  - Timing files

- Invocation (from cime/scripts directory):
  - ./create_clone --clone ~/cases/b.day1.0 --case ~/cases/b.day1.2

Best practices for copying cases

- **Using "cp –R" does not work!**
- **When using create_clone, make sure that your changes will be minor:**
  - **Same version of the code!**
  - **Same grid**
  - **Same compset**
  - **Namelist/SourceMods changes not too complex.**

- **Document changes in your case directory so that they are easy to track: README.case is a great place.**

- **If your changes are more complex, if you use multiple code versions, or if you have to create a great many cases at once, consider writing your own script to set up your cases.**

More Information/Getting Help

Model User Guides: http://www.cesm.ucar.edu/models/cesm2.0

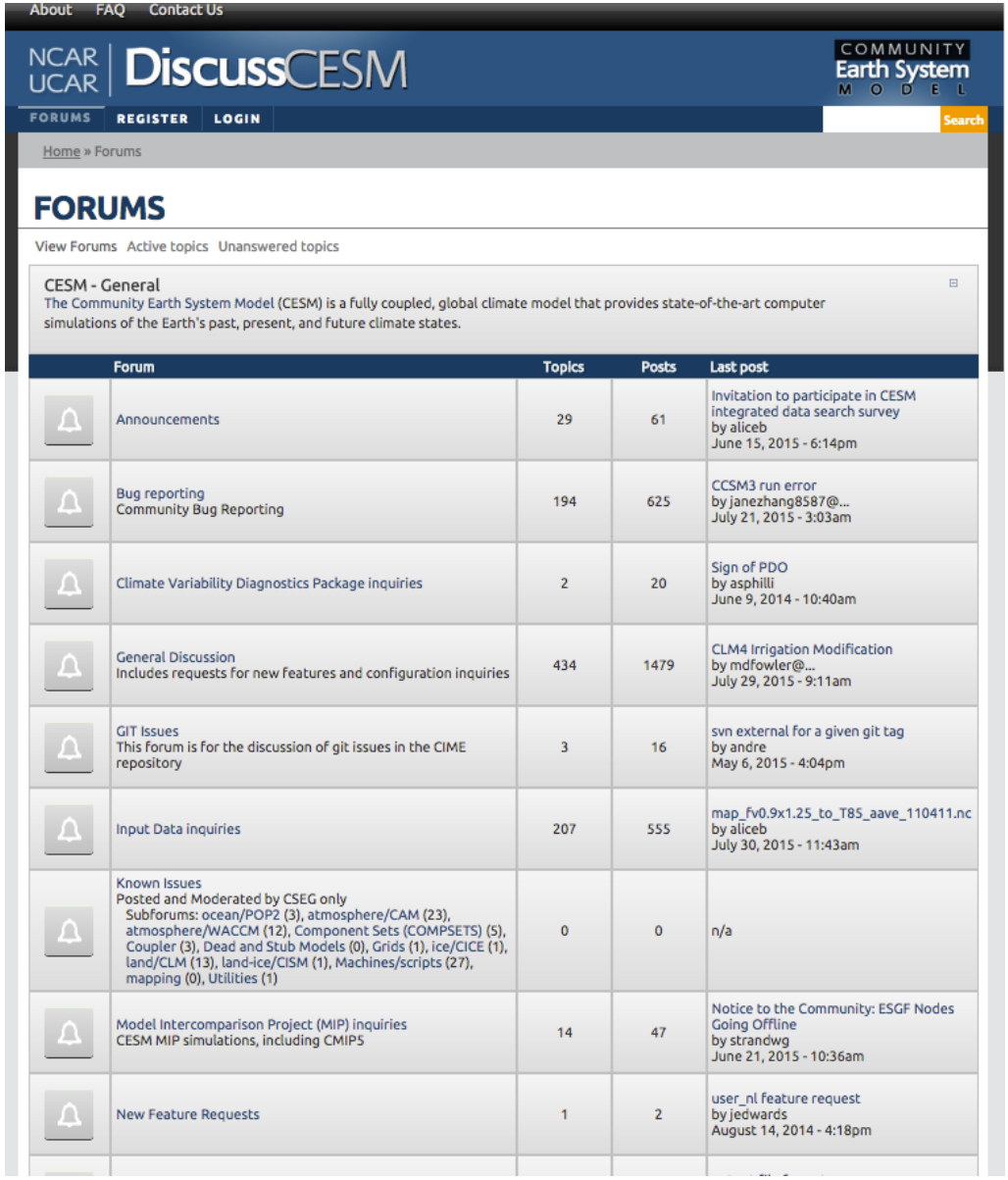
Active or Prognostic Components

Each model component page contains descriptions and documentation for active or prognostic models.

- Atmosphere
- Land
- Land Ice
- Ocean
- Sea Ice
- River Runoff
- Wave

More Information/Getting Help

CESM Bulletin Board: http://bb.cgd.ucar.edu/



About FAQ Contact Us

NCAR UCAR | DiscussCESM

COMMUNITY Earth System MODEL

FORUMS REGISTER LOGIN Search

Home » Forums

FORUMS

View Forums Active topics Unanswered topics

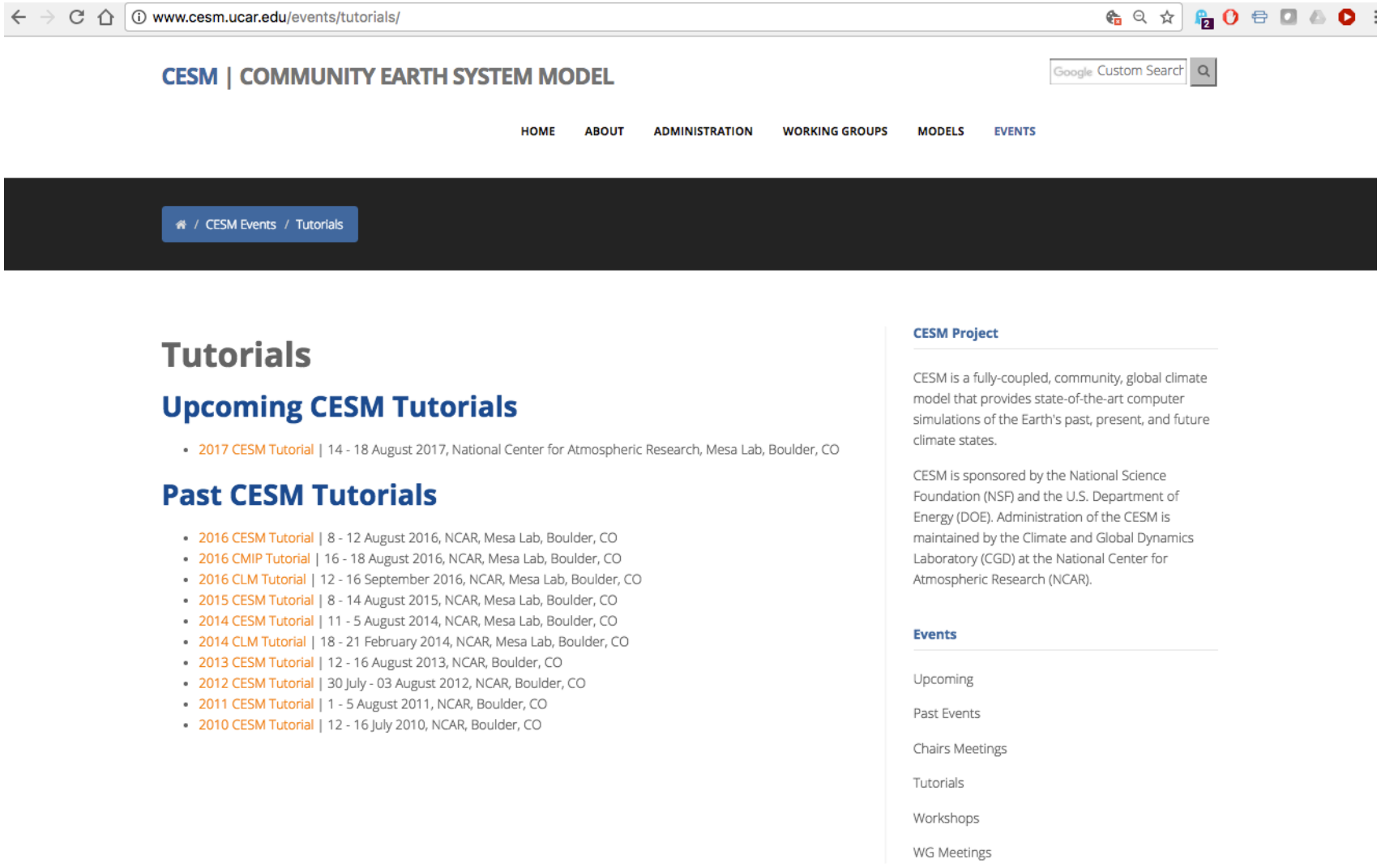
CESM - General

The Community Earth System Model (CESM) is a fully coupled, global climate model that provides state-of-the-art computer simulations of the Earth's past, present, and future climate states.

Forum	Topics	Posts	Last post
Announcements	29	61	Invitation to participate in CESM integrated data search survey by aliceb June 15, 2015 - 6:14pm
Bug reporting Community Bug Reporting	194	625	CCSM3 run error by janezhang8587@... July 21, 2015 - 3:03am
Climate Variability Diagnostics Package inquiries	2	20	Sign of PDO by asphilli June 9, 2014 - 10:40am
General Discussion Includes requests for new features and configuration inquiries	434	1479	CLM4 Irrigation Modification by mdfowler@... July 29, 2015 - 9:11am
GIT Issues This forum is for the discussion of git issues in the CIME repository	3	16	svn external for a given git tag by andre May 6, 2015 - 4:04pm
Input Data inquiries	207	555	map_fv0.9x1.25_to_T85_aave_110411.nc by aliceb July 30, 2015 - 11:43am
Known Issues Posted and Moderated by CSEG only Subforums: ocean/POP2 (3), atmosphere/CAM (23), atmosphere/WACCM (12), Component Sets (COMPSETS) (5), Coupler (3), Dead and Stub Models (0), Grids (1), ice/CICE (1), land/CLM (13), land-ice/CISM (1), Machines/scripts (27), mapping (0), Utilities (1)	0	0	n/a
Model Intercomparison Project (MIP) inquiries CESM MIP simulations, including CMIP5	14	47	Notice to the Community: ESGF Nodes Going Offline by strandwg June 21, 2015 - 10:36am
New Feature Requests	1	2	user_nl feature request by jedwards August 14, 2014 - 4:18pm

More Information/Getting Help

CESM tutorial: http://www.cesm.ucar.edu/events/tutorials/



Thank You!

The UCAR Mission is:
To advance understanding of weather, climate, atmospheric composition and processes;
To provide facility support to the wider community; and,
To apply the results to benefit society.

NCAR is sponsored by the National Science Foundation

Day 1 Exercise 0

- **This afternoon we will simply be introducing you to the system and running for the first time.**
- **Log in to cheyenne following the instructions on your compile card and follow these steps.**

Step 0: If you are not familiar with the Linux csh environment, then review this cheat sheet with a list of common commands:
http://www.geol.lsu.edu/jlorenzo/ReflectSeismol/labs/unix-cheatsheet.pdf

Step 1: From your tutorial machine window prompt, login to cheyenne:
ssh –Y cheyenne.ucar.edu

One Time Setup: Check your default login environment settings:
cp /glade/p/cesm/tutorial/tcshrc .tcshrc
source ~/.tcshrc
NOTE: all tutorial logins default to tcsh and environment settings are in ~/.tcshrc
env

Step 2: login to a cheyenne compute node.
cp /glade/p/cesm/tutorial/compile_node.csh .
./compile_node.csh
This will be the step that you will run just prior to running "case.build"

Step 3: check the queue status to see your session on the compute node
whoami
qstat –u [loginname]

Step 4: logout of cheyenne compute node.
logout

Step 5: logout of cheyenne compute node.
logout

Day 1 Exercise 1

- This afternoon we will simply be introducing you to the system and running for the first time. After each step, check the files in the CASEROOT, EXEROOT and DOUT_S_ROOT directories.
- Log in to cheyenne and run the following steps.

```
# One time step
mkdir ~/cases

# go into scripts directory into the source code download
cd /glade/p/cesm/tutorial/cesm2_0_alpha07c/cime/scripts

# (1) create a new case in the directory “cases” in your home directory
./create_newcase --case ~/cases/b.day1.0 --res f19_g17 --compset B1850

# go into the case you just created in the last step
cd ~/cases/b.day1.0
./xmlquery CASEROOT

# (2) invoke case.setup
./case.setup
./xmlquery EXEROOT

# (3) build the executable on a cheyenne compute node
~/compile_node.csh
./case.build
Logout
```

Day 1 Exercise 1 – continued

This afternoon we will simply be introducing you to the system and running for the first time. After each step, check the files in the CASEROOT, EXEROOT and DOUT_S_ROOT directories.

 # (4) submit your run to the batch queue

NOTE – each day of the tutorial we will be using a different dedicated batch queue for submission.
Prior to each case.submit command, you will want to run the following xmlchange commands:

Monday:
./xmlchange –-subgroup case.run JOB_QUEUE=R1578614
./xmlchange –-subgroup case.st_archive JOB_QUEUE=R1578614

Tuesday:
./xmlchange –-subgroup case.run JOB_QUEUE=R1578615
./xmlchange –-subgroup case.st_archive JOB_QUEUE=R1578615

Wednesday:
The dedicated queue name is R1585559 and will be used in the post-processing scripts.

Thursday:
./xmlchange –-subgroup case.run JOB_QUEUE=R1578617
./xmlchange –-subgroup case.st_archive JOB_QUEUE=R1578617

Fri: R1578619
./xmlchange –-subgroup case.run JOB_QUEUE=R1578619
./xmlchange –-subgroup case.st_archive JOB_QUEUE=R1578619

Now, submit
./case.submit
qstat –u [loginname]
./xmlquery DOUT_S_ROOT

Day 1 Exercises 2-3

```
# Exercise 1: Check on your case and resubmit when it is complete.
qstat -u [loginname]
cat CaseStatus

# Changing options like STOP_N and STOP_OPTION would increase run length.
./xmlchange CONTINUE_RUN=TRUE
./case.submit

# Note that if you make a mistake, you can kill the job using its ID number displayed when you run qstat
# qdel <job_id>

# Exercise 2: create_clone

# Go back to the scripts directory
cd /glade/p/cesm/tutorial/cesm2_0_alph07c/cime/scripts

# Make a clone of the case
./create_clone --clone ~/cases/b.day1.0 --case ~/cases/b.day1.2

# Take a look in the create_clone directory.

# What is the value of CONTINUE_RUN in the new directory (this is in env_run.xml)?
# What does README.case look like?
# What other files are copied over?
# What would be the next step in building and running the cloned case?
```

Notes for this tutorial

- **There are a few things we will do this week that are different from running normally on cheyenne.**
  - **We will be using code in "/glade/p/cesm/tutorial" this week. Normally, you will use a version of the code in "/glade/p/cesm/releases", or check out your own version. *The tutorial code refers to a special account key that will not work in the future!***
  - **We will be taking turns building the model on a cheyenne compute node. Normally, you would build on a cheyenne login node and run on the batch nodes.**
- **Some general tips:**
  - **We will use short case directory names today, but in the future you may want to use longer names so that cases are easier to find. Typically, case names should include the compset, grid, and possibly a short name for the experiment.**
  - **While CESM is building, you can open a second terminal window and log in to cheyenne again. This allows you to look around or do other things while waiting for a job to complete.**

Further exercises

- **Some suggestions if you finish early today:**
  - **Look through the exercises from Christine Shields to get a preview of this Tuesday's topics.**
  - **Look through the CESM2.0 web page and other information online. Try to get a feel for what information you would need to look up to set up your own cases.**

    http://www.cesm.ucar.edu and http://www.cesm.ucar.edu/models/cesm2.0 and https://www2.cisl.ucar.edu/resources/computational-systems/cheyenne
  - **Try using the "ncview" command on one of the history files in your run directory. This is a simple but useful tool for taking a quick look at output. First, look at the system modules loaded in your login environment:**

    module list

    If ncview is not listed, then load it into your environment using:

    module load ncview
  - **Take a quick look at the NCO utilities for manipulating netCDF files:http://nco.sourceforge.net/nco.html**
  - **PLEASE register as a new user on the DiscussCESM Forums website at:**

    http://bb.cgd.ucar.edu

    Include a valid email, name, job title, and organization so I can approve your request and keep the spammers out!

Day 1 Auxiliary Exercises

In Wednesday's lab session you will be learning how to run the various diagnostic packages. You will also learn about the types of tools that are commonly used on model output. Here are some exercises that you can do to prepare yourself for Wednesday's lab session.

- Go to the CESM1 Large Ensemble Community Project pagehttp://www.cesm.ucar.edu/projects/community-projects/LENS/ After reading the project overview click on the "Diagnostics" link. Take a look at the available experiments and look at diagnostics output from the atmosphere, sea ice, land, and ocean diagnostics packages. Become familiar with the types of calculations the packages do.

- Go to each of the prognostic model web pages

- See http://www.cesm.ucar.edu/working_groups/CVC/cvdp. The **Climate Variability Diagnostics Package (CVDP)** is different from the other diagnostics packages in that it is usually run over an entire simulation and can be run on numerous simulations (CESM *and non-CESM data*) at once. The CVDP calculates the major modes of variability, trends, and provides a quantifiable metric table. Look at the website example comparisons.

- Go to http://climatedataguide.ucar.edu and explore the site. The **Climate Data Guide** contains information on over 150 different datasets, provides inter-dataset comparisons, and has dataset pros and cons evaluated by expert dataset users.

- The programming language **NCL** is used extensively within the CESM project. You will have the opportunity to run several NCL scripts on Wednesday. Take a look at the NCL Examples page to get an idea of the types of plots NCL can create: http://www.ncl.ucar.edu/Applications/